COLOUR DETECTION USING PANDAS AND OPENCV

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WHAT IS COLOUR DETECTION?

Colour detection is the process of detecting the name of any color. Simple isn't it? Well, for humans this is an extremely easy task but for computers, it is not straightforward. Human eyes and brains work together to translate light into color. Light receptors that are present in our eyes transmit the signal to the brain. Our brain then recognizes the color. Since childhood, we have mapped certain lights with their color names. We will be using the somewhat same strategy to detect color names.

MAIN ROLE PLAYER OF THIS PROJECT

Digital images are made of pixels. A pixel is a small point of colored light. When you look at a computer monitor, the image you see is actually made of a grid of these tiny dots of light. They are so small and so close together that it looks like one continuous picture. To get an idea of how small a pixel is, the monitor that I happen to be using as I write this has a resolution of 1440 x 900 (read as "1440 by 900"). That means that there are 1,440 pixels across the top and 900 pixels down one side, for a total of almost 1.3 million pixels.


One Pixel →
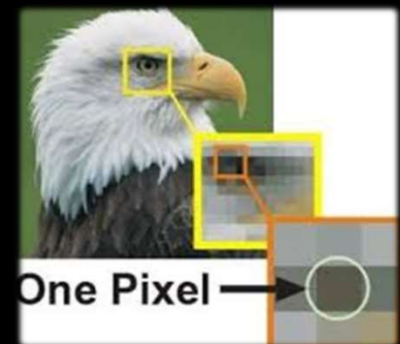
COLORS

Each pixel has a color value. We need a way to represent colors so that we can tell the computer which color to make each pixel. There are many color representations, but JavaScript uses a scheme called the RGBA color model. Basically, it means that a color is represented by four numbers:
- R (the amount of red light)(0-255)
- G (the amount of green light)(0-255)
- B (the amount of blue light)(0-255)
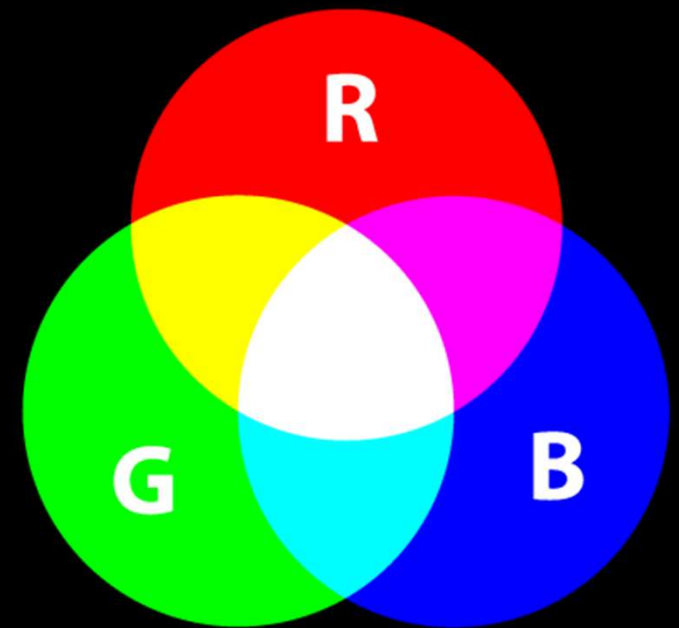
THE DATASET

- Colors are made up of 3 primary colors; red, green, and blue. In computers, we define each color value within a range of 0 to 255. So in how many ways we can define a color? The answer is 256*256*256 = 16,581,375. There are approximately 16.5 million different ways to represent a color. In our dataset, we need to map each color's values with their corresponding names. But don't worry, we don't need to map all the values. We will be using a dataset that contains RGB values with their corresponding names. The CSV file for our dataset has been taken from this link:

- **Colors Dataset**

- The colors.csv file includes 865 color names along with their RGB and hex values.

A	B	C	D	E	F	G
air_force_b	Air Force Bl	#5d8aa8	93	138	168	
air_force_b	Air Force Bl	#00308f	0	48	143	
air_superio	Air Superio	#72a0c1	114	160	193	
alabama_cr	Alabama Cr	#a32638	163	38	56	
alice_blue	Alice Blue	#f0f8ff	240	248	255	
alizarin_cri	Alizarin Cri	#e32636	227	38	54	
alloy_orang	Alloy Orang	#c46210	196	98	16	
almond	Almond	#efdecd	239	222	205	
amaranth	Amaranth	#e52b50	229	43	80	
amber	Amber	#ffbf00	255	191	0	
amber_sae	Amber (Sae	#ff7e00	255	126	0	
american_r	American R	#ff033e	255	3	62	
amethyst	Amethyst	#96c	153	102	204	
android_gr	Android Gr	#a4c639	164	198	57	
anti_flash_	Anti-Flash	#f2f3f4	242	243	244	
antique_br	Antique Bra	#cd9575	205	149	117	
antique_fu	Antique Fu	#915c83	145	92	131	
antique_ru	Antique Ru	#841b2d	132	27	45	

NEED OF PANDAS FOR PROJECT

pandas is a Python package providing fast, flexible, and expressive data structures designed to make working with "relational" or "labeled" data both easy and intuitive. It aims to be the fundamental high-level building block for doing practical, real world data analysis in Python. Additionally, it has the broader goal of becoming the most powerful and flexible open source data analysis / manipulation tool available in any language.

COLOR DETECTION USING OPENCV

- OpenCV is a Computer Vision library. It is a collection of C functions with a few C++ classes that implement popular Image Processing and Computer Vision algorithms. Computer vision is the science that means to give a comparative, if not better, capacity to a machine or PC. Computer vision is worried about the programmed extraction, investigation and comprehension of valuable data from a single picture or a grouping of pictures.

HARDWARE ➡ REQUIRMENT ⬅ SOFTWARE

- i3 Processor Based Computer or higher
- Memory: 1 GB RAM
- Hard Drive: 50 GB
- Monitor

- Windows 7 or higher
- Python (Pandas) (OpenCV)
  - Excel Database

FUTURE SCOPE

- It can be upgraded to 3D object Color Detection. And with the help of Machine learning concept we can accomplish this future idea.

REFRENCE

- https://shsu-ir.tdl.org/shsu-ir/bitstream/handle/20.500.11875/1164/0781.pdf?sequence=1
- https://ieeexplore.ieee.org/document/6208293/
- https://ieeexplore.ieee.org/document/4679917/